Navigating Conservation-Development-Disaster Complexities in Social-Ecological Systems Using Role-play Serious Gaming

Wei Liu[1,2], Piotr Magnuszewski[1,3], Yidan Yang[2,] & Nan Chen[2]

1. International Institute for Applied Systems Analysis, Laxenburg, Austria; 2. Human and Environment Linkage Program, Beijing, China; 3. Center for System Solutions, Wroclaw, Poland

Conservation-Development-Disaster, Resilience, and Serious Gaming

Globally natural disaster and climate change risk is on the rise, so does the uncertainty of their impact at local/regional scales. The increasing uncertainty in disaster and climate hazards creates daunting challenges for conservation and development, especially in Global Biodiversity Hotspots. Building resilience with limited resources in these complex Social-Ecological Systems require critical understanding of stakeholder cognitive and decision-making processes.

Serious Game (aka social simulation) emerges as a new method to understand stakeholder decision-making and interaction under uncertainty and how resilience/vulnerability emerges as a result of such dynamic interactions. Simulation games is an effective education and communication tool in building soft skill capacities on communication, coordination, leadership, negotiation and collective action, which the current capacity-building system often do not provide.

Forest@Risk - community pathways to sustainable forest management with uncertain disasters
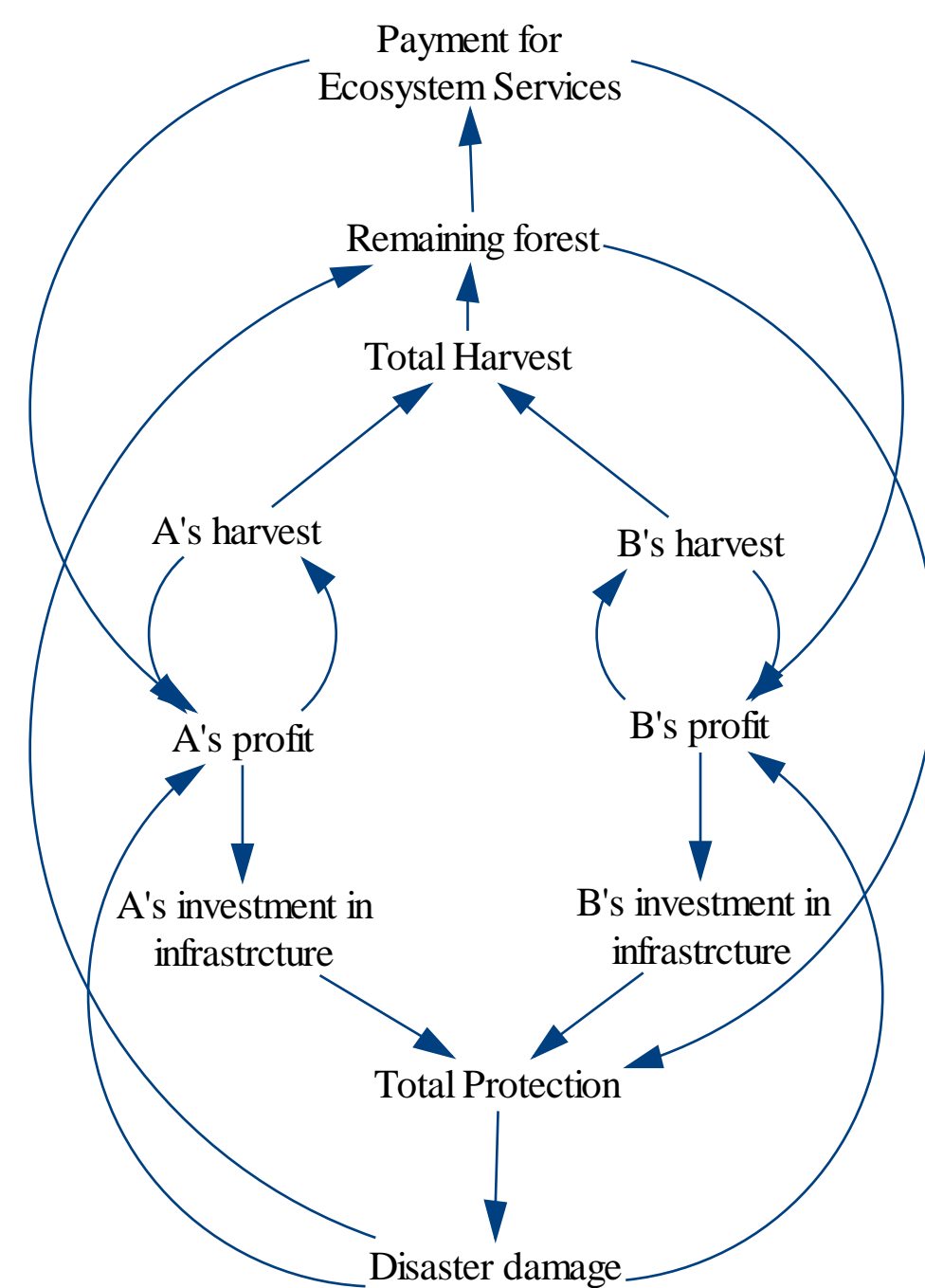
An earlier version of the game, named Forest Game, was developed in the international project "The Emergence of Adaptive Governance Arrangements for Tropical Forest Ecosystems" funded by National Science Foundation (USA). The current version, with disaster uncertainty being introduced, was inspired by a 13-year research program at Sichuan Giant Panda Sanctuary World Heritage, a global hotspot region for both biodiversity and disasters (earthquake, landslide and flood) and developed in the project "Sustainable Post-earthquake Community Reconstruction" funded by Cheung Kong Philanthropic Fund (China).

FOREST — Disaster, Harvest, Sale, Regeneration
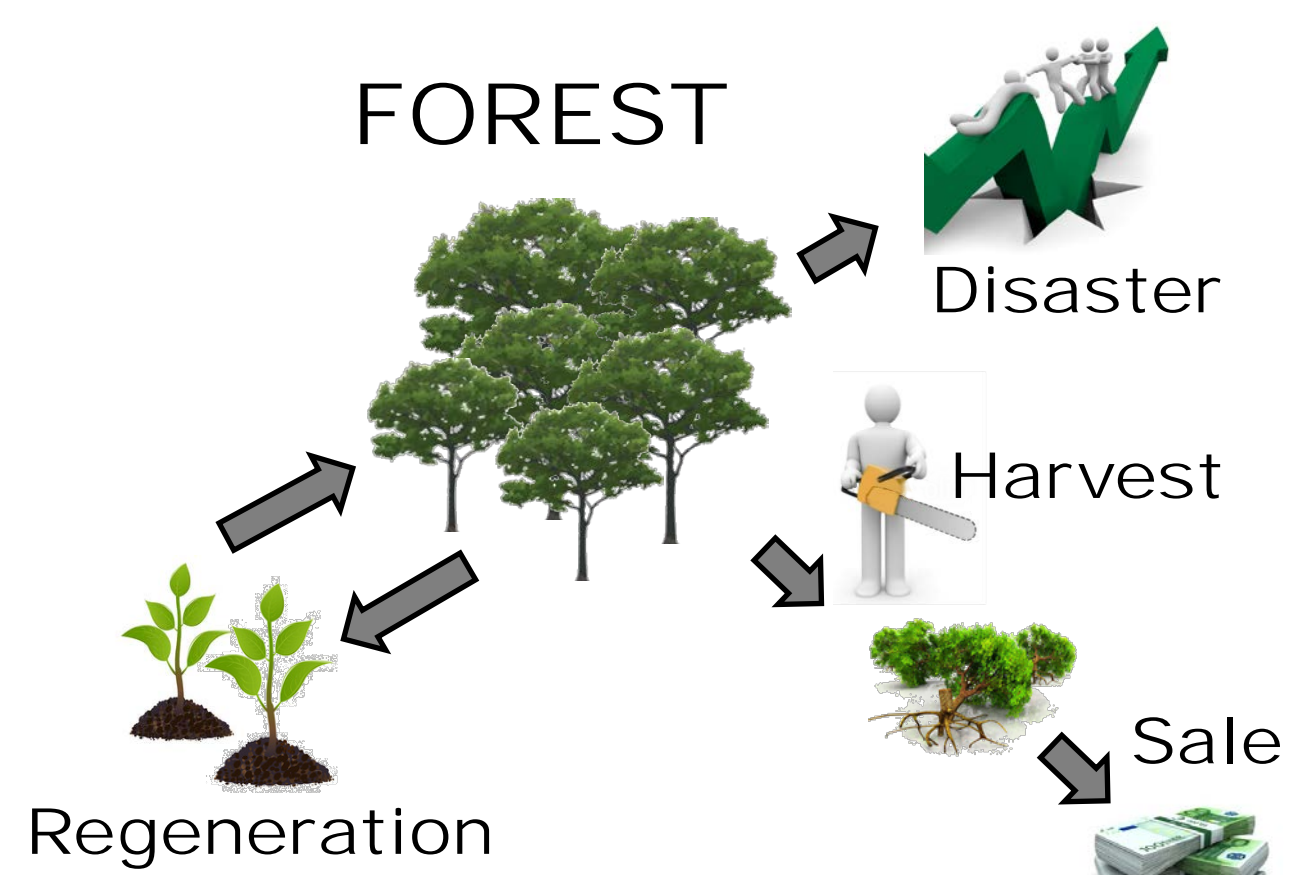
A forest community faced by recurrent but uncertain earthquake and flood hazards that may damage not only households assets, but also forest ecosystem and infrastructures.

Challenges – Common and Public Goods

Plays need to work out collective actions to manage one common good – the forests (which they cut for income) one public good - the disaster protection infrastructure (which they need collectively invest to build).

Payment for Ecosystem Services · Remaining forest · Total Harvest · A's harvest · B's harvest · A's profit · B's profit · A's investment in infrastrcture · B's investment in infrastrcture · Total Protection · Disaster damage

Game Schedule

NEW ROUND

1. Disasters: information about losses

2. Decisions Phase 1: timber harvesting and monitoring

2-3 community meetings - exchange information and discuss collection rules

3. Results: forest, income, monitoring reports.

4. Decisions Phase 2: debt payments, education, sanctions investments in disaster protection infrastructure.

Preliminary Results

20+ session run in China, India, Nepal and Singapore, in various forms, such as in professional conferences or public sessions. Participants (~400) include community conservation and development project stakeholders, researchers, civil society organization staff, general public and government officials, researchers, students (high school, college and post-graduate).
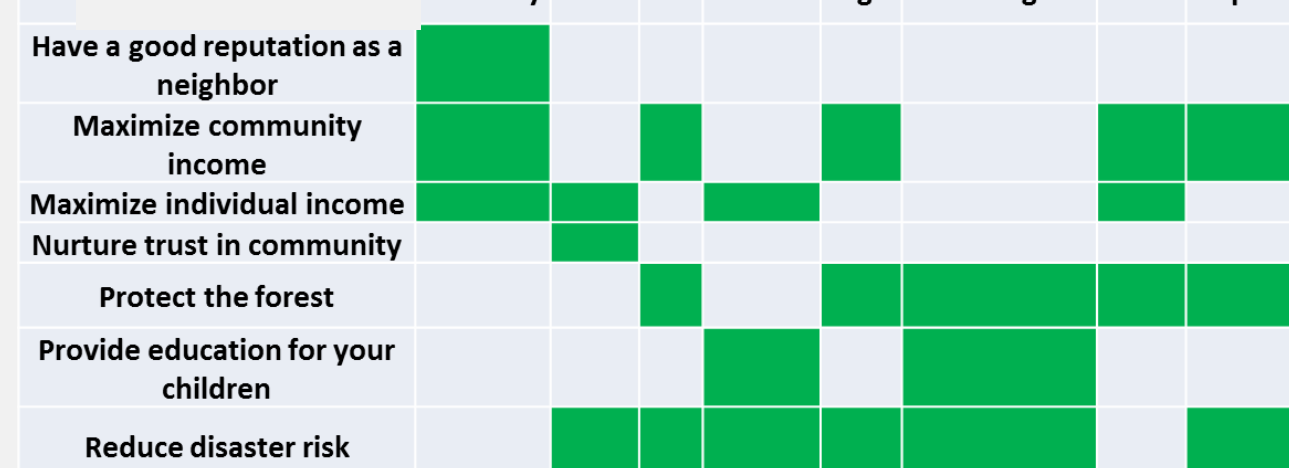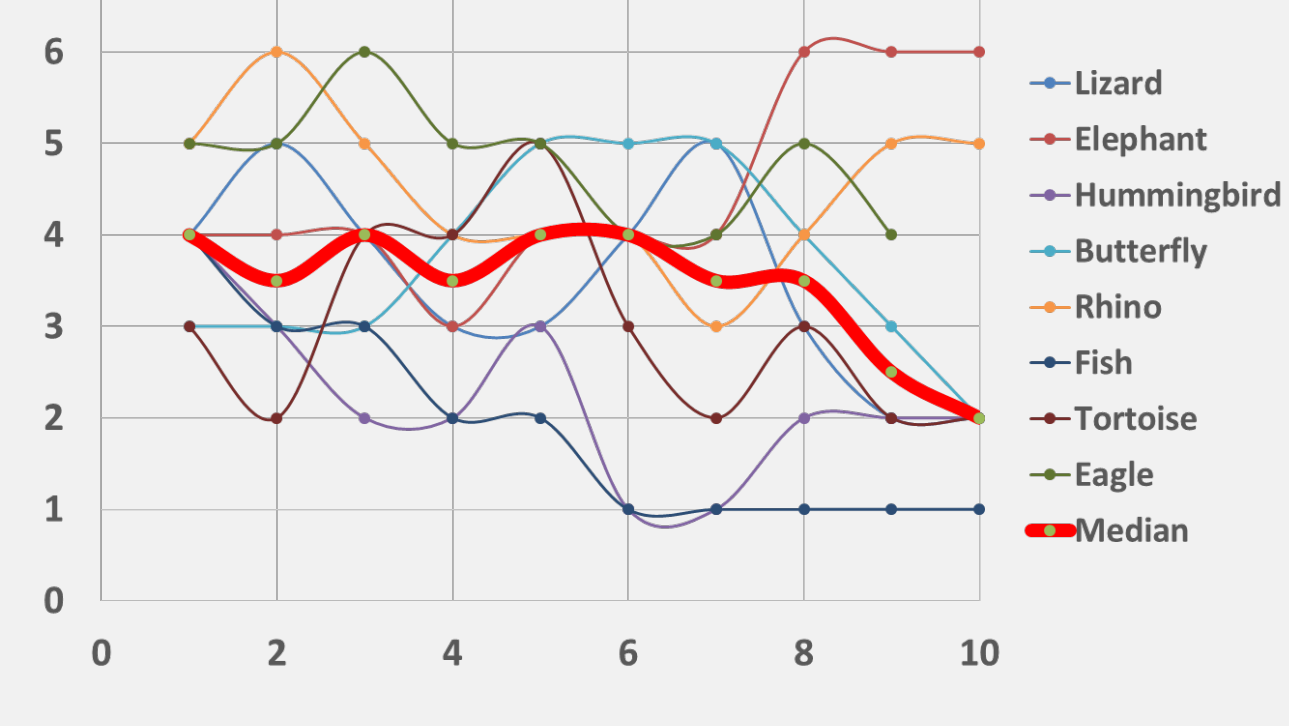

2015/08 Beijing
2016/07 Singapore
2017/07 Kathmandu

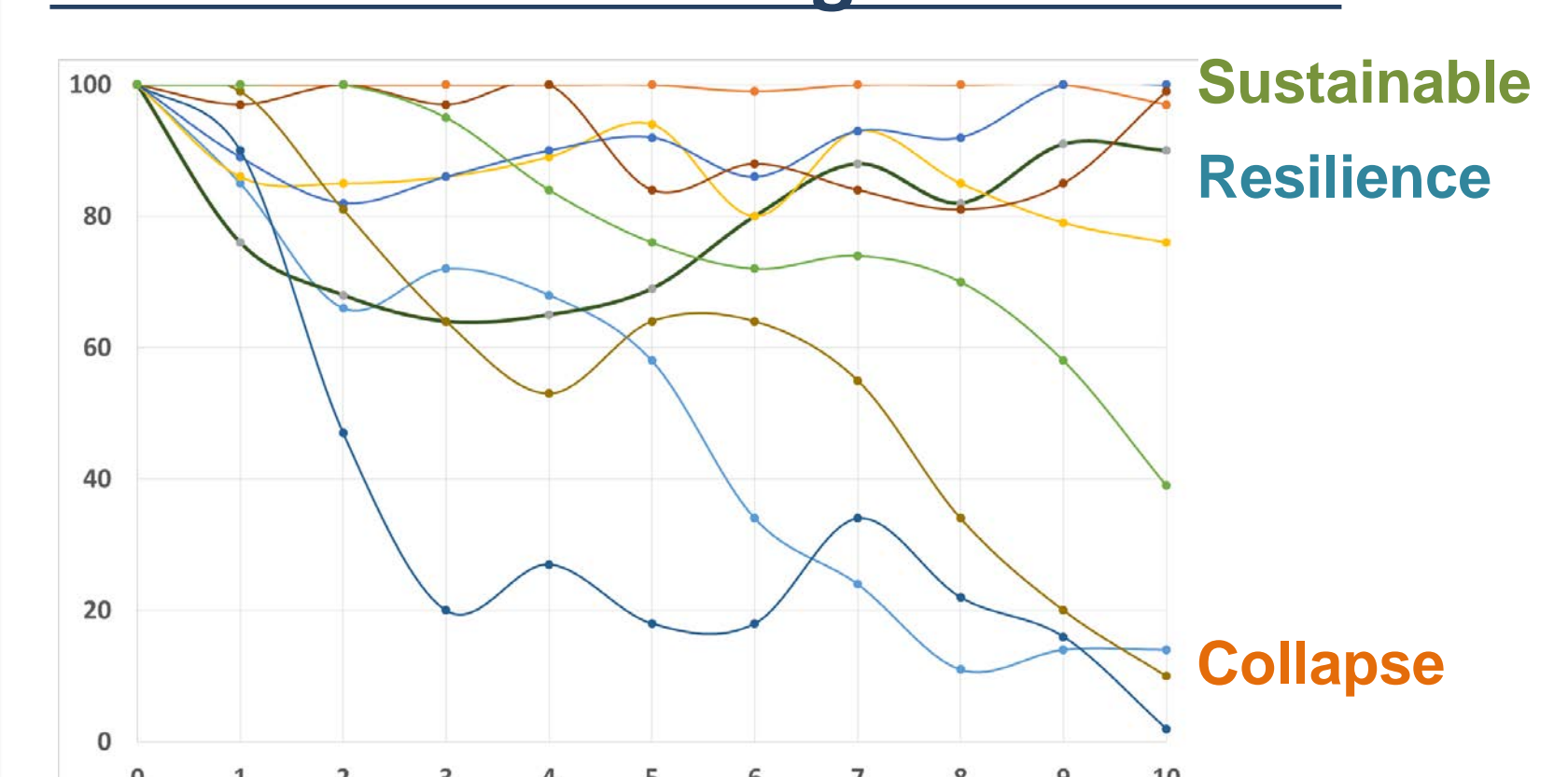### Brief results from one game session

Forest size · Total harvest · Average wealth · Earthquake magnitude · Earthquake protection (infra.) · Earthquake protection (total) · Flood magnitude · Flood protection (infra.) · Flood protection (total) · 0 1 2 3 4 5 6 7 8 9 10 (Rounds)

Goals

Butterfly Rhino Fish Tortoise Eagle Hummingbird Lizard Elephant

Have a good reputation as a neighbor
Maximize community income
Maximize individual income
Nurture trust in community
Protect the forest
Provide education for your children
Reduce disaster risk

Trust

Lizard · Elephant · Hummingbird · Butterfly · Rhino · Fish · Tortoise · Eagle · Median

Forest trends across game sessions

Sustainable · Resilience · Collapse

More comparative analyses on going, including trends in wealth, wealth distribution, harvest, investment in infrastructure, etc.

Participants feedback

Groups that were able to communicate effectively and nurture trust usually resulted in higher forest cover, but not always higher level of community wealth and lower level of income disparity. In the future, more uncertainties may be built in, including market fluctuation (i.e., wood sale price) and ecological succession (i.e., forest regeneration rate).

Interested in knowing more and/or playing – visit www.Games4Sustainbility.org